Two New Species of Orchidaceae from Brazil: *Bulbophyllum carassense* and *Lepanthopsis vellozicola*

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Abstract. Two new species of Orchidaceae from the Serra do Caraça, state of Minas Gerais, Brazil, are described and illustrated. *Bulbophyllum carassense* R. C. Mota, F. Barros & Stehmann is endemic to the Serra do Caraça and is epiphytic on trees or sometimes rupicolous. It is related to *B. bidentatum* (Barbosa Rodrigues) Cogniaux, *B. filifolium* Borba & Smidt, and *B. plumosum* (Barbosa Rodrigues) Cogniaux, all belonging to section *Xiphizusa* (Reichenbach f.) Cogniaux. A table comparing diagnostic characters for *B. carassense* with morphologically related species is presented. The second new species is *Lepanthopsis vellozicola* R. C. Mota, F. Barros & Stehmann, which is also rare and endemic to this region as an epiphyte on *Vellozia compacta* Martius, in campos rupestres vegetation. This is the only species in *Lepanthopsis* (Cogniaux) Ames with the following combination of characters: the secondary stems show only two evident internodes and are subtended by two leaf sheaths with smooth margins, and the lateral sepals are completely connate. A taxonomic key to identify the Brazilian species of *Lepanthopsis* is presented.

Resumo. Duas novas espécies de Orchidaceae, ambas procedentes da Serra do Caraça, Minas Gerais, Brasil, são descritas e ilustradas. *Bulbophyllum carassense* R. C. Mota, F. Barros & Stehmann é rara e endêmica da Serra do Caraça e do seu entorno, epífita e ocasionalmente rupícola. Tem afinidade com *B. bidentatum* (Barbosa Rodrigues) Cogniaux, *B. filifolium* Borba & Smidt e *B. plumosum* (Barbosa Rodrigues) Cogniaux, todas da seção *Xiphizusa* (Reichenbach f.) Cogniaux. É apresentada uma tabela comparativa dos caracteres morfológicos de *B. carassense* e suas espécies relacionadas. A segunda espécie é *Lepanthopsis vellozicola* R. C. Mota, F. Barros & Stehmann, também rara e endêmica da Serra do Caraça, crescendo exclusivamente como epífita sobre *Vellozia compacta* Martius, na vegetação de campo rupestre. É a única espécie do gênero a apresentar as seguintes características: caule secundário com dois entrenós evidentes, associados a duas bainhas foliares com margens lisas, e sépalas laterais totalmente conadas. É apresentada uma chave taxonômica artificial para identificação das espécies de *Lepanthopsis* (Cogniaux) Ames ocorrentes no Brasil.

Key words: Brazil, *Bulbophyllum*, IUCN Red List, *Lepanthopsis*, Minas Gerais, Orchidaceae, Serra do Caraça.

In Brazil, the Serra do Caraça is located in the municipalities of Catas Altas, Mariana, and Santa Bárbara in Minas Gerais and is part of the Quadrilátero Ferrífero (the Iron Quadrangle), the southernmost portion of the Serra do Espinhaço. The climate is characterized by mild and rainy summers and dry winters, with a mean annual precipitation of 1500 mm (Brandão et al., 1994). Mild temperatures prevail throughout the year, with maximum temperatures seldom exceeding 30°C and minimum temperatures sometimes reaching below zero, mainly at high altitudes. The Serra do Caraça includes rocks of the

Minas Supergroup and Cenozoic period (Dutra et al., 2002), and the altitude ranges from 750–2072 m. The elongated amphitheater shape of the range is formed by many peaks, and the north-facing opening harbors the Caraça Sanctuary, at about 1300 m (Silveira, 1924). This is the headquarters of the Reserva Particular do Patrimônio Natural do Caraça, the largest private preservation area in the range. Rainwater flows into the Piracicaba river basin, which is part of the Doce river basin.

The Serra do Caraça is located in the Atlantic Forest biome, comprising mainly grasslands that are surrounded and interspersed with forests. The dominant phytophysiognomy are campos rupestres (rocky fields or rocky grasslands) and semideciduous forests. Campos rupestres vegetation is characterized by a variety of herbaceous plants or shrubs growing directly on rocks, in rock crevices, or on the flat sandy dark soil accumulated on top. The semideciduous forests are often located on slopes and/or associated with the rocky fields.

Two new species of the genera *Bulbophyllum* Thouars and *Lepanthopsis* (Cogniaux) Ames were found during the inventory of the family Orchidaceae in the Serra do Caraça. Both are described and illustrated here: *B. carassense* R. C. Mota, F. Barros & Stehmann belongs to section *Xiphizusa* (Reichenbach f.) Cogniaux, and *L. vellozicola* R. C. Mota, F. Barros & Stehmann belongs to section *Lepanthopsis*.

The genus *Bulbophyllum* is pantropical and is composed of almost 1000 species (Dressler, 1993). Almost 60 species are known in Brazil (Smidt & Borba, 2007), in five sections (Pabst & Dungs, 1975): *Bulbophyllaria* (Reichenbach) Grisebach, *Didactyle* (Lindley) Cogniaux, *Micrantha* Barbosa Rodrigues, *Napellii* Reichenbach, and *Xiphizusa*. *Bulbophyllum carassense* is assigned to section *Xiphizusa*, which currently includes 13 Brazilian species, most of which are epiphytic in southeastern Brazil forests, with a few that are rupicolous in rocky fields (Borba & Smidt, 2004). This section is distinguished by its slender and nongeniculate inflorescences, long lateral sepals fused to each other up to the apex forming a synsepal, columns with two long stelidia close to the apex and two small ventral teeth, and an aggregate and corrugated secondary stem.

The genus *Lepanthopsis* currently comprises 43 species and is widespread in tropical rainforests from Mexico through Central America and the West Indies, to southern Brazil, mainly in areas higher than 1000 m, with the highest species concentration in the West Indies (Luer, 1991). *Lepanthopsis densiflora* (Barbosa Rodrigues) Ames and *L. floripecten* (Reichenbach f.) Ames, the two species of the genus known from Brazil, are found in southern and southeastern Brazil.

1. **Bulbophyllum carassense** R. C. Mota, F. Barros & Stehmann, sp. nov. TYPE: Brazil. Minas Gerais: Catas Altas, Serra do Caraça, 20°04′55.2″S, 43°29′11.7″W, 1200 m, 20 Mar. 2005 (fl.), *R. C. Mota 2819* (holotype, BHCB; isotypes, RB, SP). Figure 1.

Affine *Bulbophyllo bidentato* (Barbosa Rodrigues) Cogniaux, *B. filifolio* Borba & Smidt et *B. plumoso* (Barbosa Rodrigues) Cogniaux sectionis *Xiphizuzae* (Reichenbach f.) Cogniaux, sed habitu plerumque epiphytico, pseudobulbis fortiter corrugatis dorsaliter compressis, foliis lineari-oblongis usque lineari-ellipticis atque labello in dimidio distali vinaceo reliquo eburneo vel flavido et vinaceo-punctato, fascia longitudinali atropurpurascente e basi usque ad apicem ornato differt.

Epiphytic or rupicolous herbs; roots cylindrical, branched or not, white to light green, to 10 × 0.1 cm; rhizome 3–7 mm between successive pseudobulbs; secondary stems modified into pseudobulbs, conspicuously corrugate, glossy, ovoid, slightly to conspicuously dorsally compressed, 1-leaved, dark green to brownish green, aggregate, 4–8.5 × 6–13 mm. Leaves chartaceous to subchartaceous, flat to slightly conduplicate, narrowly oblong to linear-elliptic, dark green, slightly bicolored, 15–65 × 2.5–6 mm, apex acute to mucronate. Inflorescence a raceme, slightly nutant, basal, 1 per pseudobulb; peduncle 24–60 mm; rachis 15–55 mm; peduncular bracts with coalescent margins to the apex, scarious at anthesis, 4–6 mm, the free part lingulate, apex obtuse; floral bracts triangular, scarious at anthesis, 1.5–4 mm, apex acute. Flowers resupinate, 4 to 14 simultaneously opening per inflorescence, facing downward; pedicel and ovary glabrous, brownish green with some vinaceous spots, 1–2 × 1–1.5 mm; dorsal sepal glabrous, membranous, lanceolate to narrowly ovate, erect to patent, cream colored to light green, covered with vinaceous spots, concentrated basally, 6.5–8.5 × 1.8–2.5 mm, concave at base, apex slightly canaliculate, straight to recurved, margin entire to shortly and sparsely ciliate, apex mucronate to acute, lateral sepals glabrous, subcoriaceous, fused to apex, erect to patent, cream colored to light green, vinaceous spotted, especially basally, synsepal 7–8.5 × 2.5–3.5 mm, canaliculate, lanceolate, symmetrical, margin entire, apex acute to acuminate; petals membranous, flat to almost flat, lanceolate to erect to patent, almost entirely vinaceous, 2.5–3.5 × 1–1.4 mm, base asymmetrical, margin long-ciliate, cilia vinaceous to yellowish, apex acute to obtuse; lip glabrous, fleshy, obovate-lanceolate, erect, flat to slightly undulate, sulcate in basal 1/3, flat to slightly canaliculate in apical 2/3, 5.5–7.5

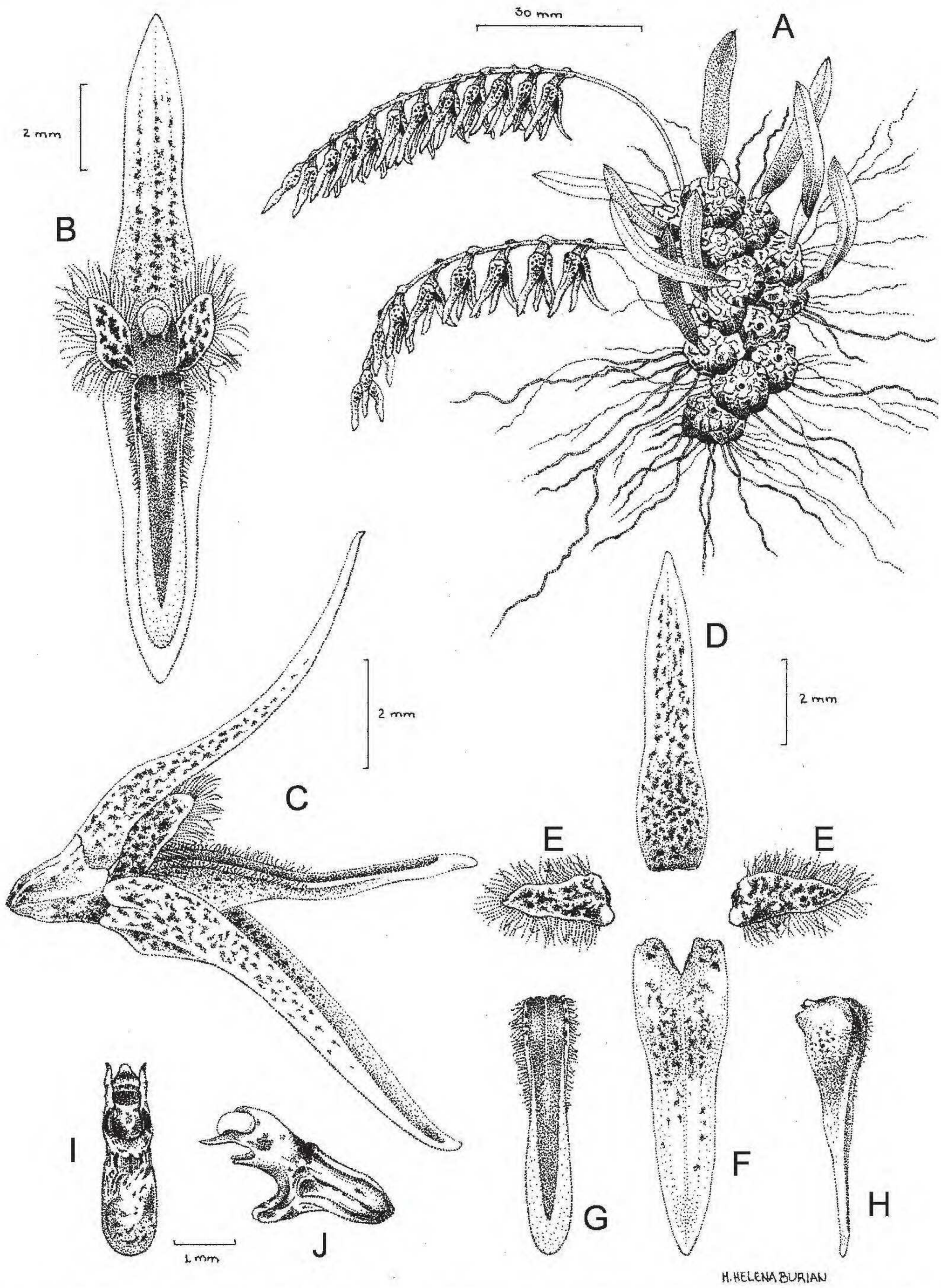

Figure 1. *Bulbophyllum carassense* R. C. Mota, F. Barros & Stehmann. —A. Habit. —B. Flower, frontal view. —C. Flower, side view. —D. Dorsal sepal. —E. Petals. —F. Synsepal formed by the lateral sepals. —G. Lip, frontal view. —H. Lip, lateral view. —I. Column, ventral view. —J. Column, lateral view showing the beak-shaped apical anther. Drawing from living material.

× 0.8–1.2 mm, with a central, longitudinal, salient stripe, which gradually thins apically, the lateral lobes reduced, semilunate, restricted to the basal 1/4 of the lip, projected upward, margin ciliate in basal 1/3 and entire above, apex obtuse, distal half of lip vinaceous with a longitudinal, central, darker vinaceous stripe to the apex, the remaining cream colored to light yellow with some vinaceous spots; column glabrous, slightly curved, erect to patent, cream colored with some vinaceous spotting, 1.3–1.8 × 0.7–0.9 mm, apex apiculate, stelidia laminate, projected upward, with or without 2 small ventral teeth near the median region, teeth, when present, projected upward forming an acute angle with the column axis, column foot fleshy, ovate, frontally compressed, 1–2 mm long; anther cap verrucose, cordate, vinaceous, 0.7–0.8 × 0.5–0.7 mm, apex mucronate, incurved; pollinia 2, subspherical to reniform, hard, yellow, 0.3–0.4 mm; rostellum membranous, laminar, apex truncate; stigma hollow. Fruit spherical, ribbed, glabrous to sparsely tomentose, 4–5 × 3.5–4 mm.

Distribution and habitat. *Bulbophyllum carassense* has only been found in and near the Serra do Caraça. The species occurs as an epiphyte on riverbanks and in semideciduous forests, and sometimes as a rupicolous plant in semideciduous forests between 900 and 1200 m (pers. obs.). It is a rare species and only a few populations have been found so far. Individuals are grouped in isolated tufts of varied sizes, growing upright or hanging on trunks and rocks.

IUCN Red List category. According to the current knowledge of the species and using IUCN Red List categories and criteria (IUCN, 2001), *Bulbophyllum carassense* can be classified as Endangered (EN A2; B1ab[iii]; C1). A few known populations are protected in the Reserva Particular do Patrimônio Natural do Caraça. The endangered populations occur over canga vegetation in the Iron Quadrangle, the most important mining region of southeastern Brazil (Jacobi et al., 2007).

Phenology. *Bulbophyllum carassense* was observed in flower from February to April.

Etymology. The species epithet refers to the type locality, in the Serra do Caraça in Minas Gerais, Brazil.

Diagnostic features. The flowers of *Bulbophyllum carassense* resemble those of *B. bidentatum*, *B. filifolium*, and *B. plumosum*, which all belong to section *Xiphizusa*. Table 1 presents the diagnostic characters for these species.

2. Lepanthopsis vellozicola R. C. Mota, F. Barros & Stehmann, sp. nov. TYPE: Brazil. Minas Gerais: Catas Altas, Serra do Caraça, 20°06′S, 43°27′W, 1850 m, 29 Apr. 2004 (fl.), *R. C. Mota 2437* (holotype, BHCB; isotypes, RB, SP). Figure 2.

Species haec habitu ad *Velloziam* epiphytico, caulibus secundariis internodiis duobus tantum instructis, vaginis foliaribus marginibus laevibus et floribus sepalis lateralibus usque ad apicem coalescentibus ab omnibus congeneris recedit.

Herb epiphytic, caespitose, 5–30 mm tall; roots unbranched, cylindrical to slightly compressed, white to light green, to 40 mm, 1.3 mm diam.; rhizome 0.4–1.5 mm between successive secondary stems; secondary stem glabrous, with basal internodes reduced and covered with imbricate prophylls and 2 evident internodes, cylindrical, not thickened, light green to reddish brown, 0.8–4 × 0.3–0.5 mm; sheaths of the secondary stem 2, glabrous, ribbed, membranous, tubular to crateriform, brownish green, imbricate, unequal, the larger 1.2–4.5 mm, the smaller 0.8–2.5 mm, margins smooth, slightly thickened, apex shortly cuspidate. Leaves glabrous, fleshy, convex on both faces or only the abaxial face, usually sulcate at the median vein, widely elliptic, ovate, or orbicular, light green to reddish brown, slightly bicolorous, 1 per secondary stem, 2.7–9 × 2.5–6 mm, margin entire, apex obtuse, mucronate, base attenuate. Inflorescence a raceme, apical, slightly bending, 1 per secondary stem, longer than the secondary stem and leaf; peduncle glabrous, filiform, brownish green to vinaceous, 4–12 mm; rachis brownish green to vinaceous, 5–25 mm; peduncular bracts glabrous, membranous, infundibular to truncate, 0.8–2.5 mm, the basal bract twice as long as the others, margin entire, apex shortly cuspidate to acute; floral bracts glabrous, membranous, crateriform, 0.7–1.3 mm, margins fused to midpoint, free portion triangular to rounded, margin entire, apex acute to obtuse. Flowers resupinate, 4 to 8 per inflorescence, simultaneously opening, in 2 opposite ranks, with a pectinate appearance along the rachis; pedicel glabrous, slightly ribbed, brownish yellow to vinaceous, 0.6–1 × 0.2–0.3 mm; ovary glabrous, slightly ribbed, brownish yellow to vinaceous, 0.3–0.4 × 0.2–0.3 mm; dorsal sepal glabrous, membranous, concave, ovate to lanceolate, straight to slightly recurved, greenish yellow to vinaceous, sometimes with a darker longitudinal, central stripe, 1.2–2 × 0.6–0.9 mm, margin entire, apex acute, slightly to conspicuously recurved; lateral sepals glabrous, membranous, navicular, fused to each other forming a concave, ovate, erect to patent synsepal, greenish yellow to vinaceous, 1.2–1.7 × 0.8–1.3 mm, margin entire, apex shortly acuminate; petals glabrous, membranous, concave,

Table 1. Comparative morphological traits of *Bulbophyllum carassense* and related species.

	B. carassense	*B. bidentatum*	*B. filifolium*	*B. plumosum*
Habit and habitat	epiphyte or rupicolous in semideciduous and gallery forests	rupicolous, in rocky fields in Minas Gerais	rupicolous, in rocky fields in Minas Gerais	rupicolous in rocky fields or epiphyte in semideciduous and gallery forests; widely distributed in Brazil
Pseudobulbs	ovoid, markedly corrugated and slightly to conspicuously compressed dorsally	conical to subspherical, not compressed dorsally	smooth to only slightly corrugated, not compressed dorsally	conical to subspherical, angled, smooth to slightly corrugated, sometimes slightly compressed dorsally
Leaves	chartaceous to subcoriaceous, flat to slightly conduplicate, narrowly oblong to linear-elliptic, 15–65 × 2.5–6 mm	coriaceous, navicular to conduplicate at the base and slightly conduplicate upward, elliptic to oblong-elliptic, 10–40 × 7–10 mm	coriaceous, flat to slightly conduplicate, linear, 25–40 × ca. 1 mm	coriaceous, flat, oblong-elliptic to oblong, 25–50 × 8–15 mm
No. of flowers per inflorescence	4 to 14	4 to 6	1	5 to 12
Sepals	cream colored to light green, covered by vinaceous spots; dorsal sepal 6.5–8.5 × 1.8–2.5 mm, lateral sepals 7–8.5 × 2.5–3.5 mm	vinaceous; dorsal sepal 4.5–7 × 1.7–2 mm, lateral sepals 4.5–7 × 2–2.5 mm	purple with chestnut-colored spots; dorsal sepal ca. 14 × 3 mm, lateral sepals 13–15 × 4–6 mm	chestnut colored; dorsal sepal 15–20 × 3–4 mm, lateral sepals 15–20 × 4–5 mm
Dorsal petals	margin ciliate, vinaceous, 2.5–3.5 × 1–1.4 mm	margin pilose, vinaceous with purple central vein, 1.7–2.2 × ca. 1.5 mm	margin pilose, vinaceous with purple central vein, ca. 4 × 3 mm	margin pilose, white with purple central vein, 5–7 × 2–2.5 mm
Lip	fleshy, obovate-lanceolate, 5.5–7.5 × 0.8–1.2 mm	margin entire, purple, fleshy, lineate, 4.5–6 × 1.3–1.5 mm	margin pilose in basal portion, short hairs, purple, fleshy, oval, ca. 9 × 1.7 mm	margin pilose in basal portion, short hairs, chestnut colored with purple stripes, membranous in apical 2/3, spatulate, 14–18 × 1.5–2 mm

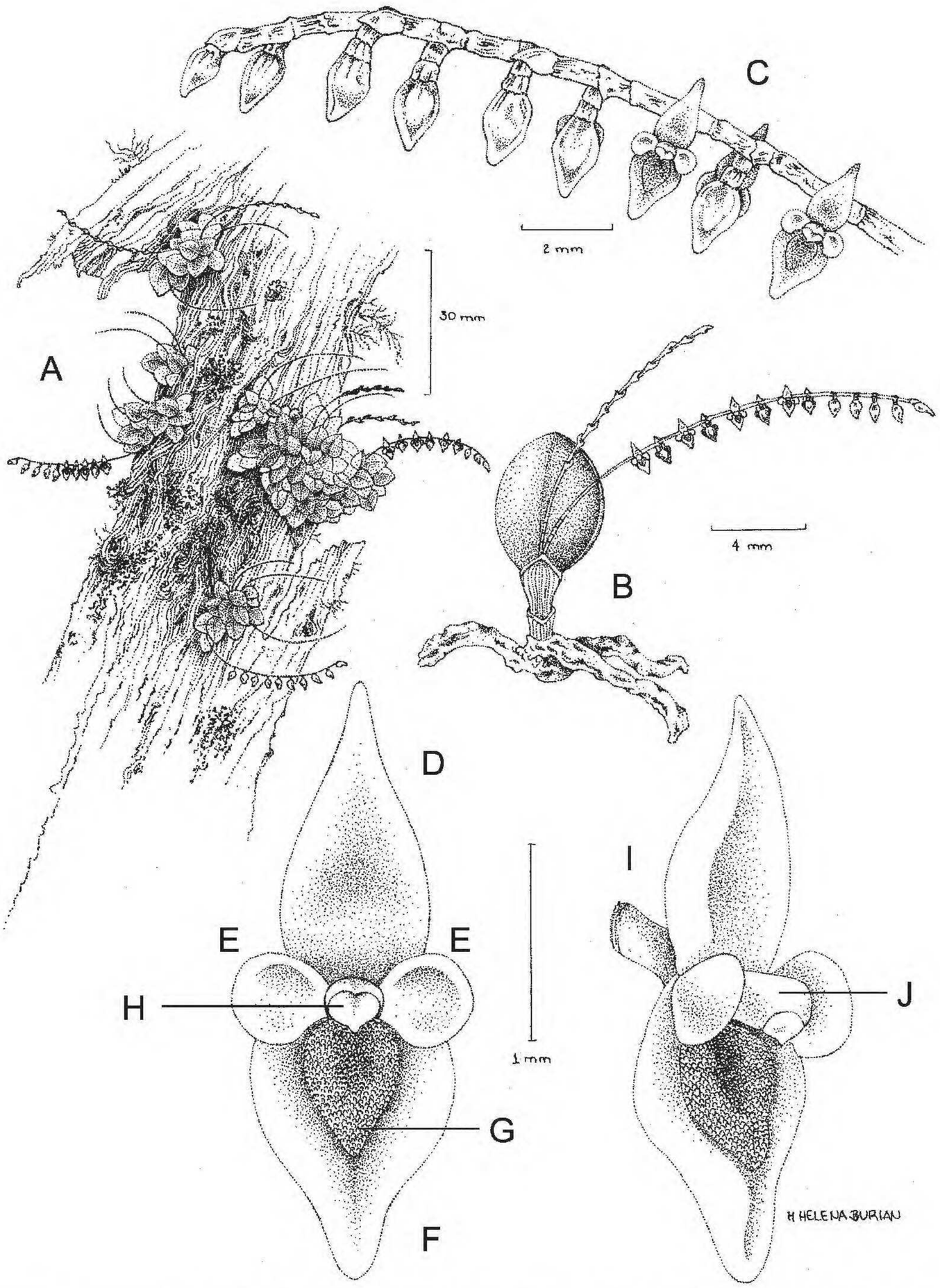

Figure 2. *Lepanthopsis vellozicola* R. C. Mota, F. Barros & Stehmann. —A. Habit of plants over a *Vellozia* branch. —B. An isolated flowering sympodium with roots. —C. Detail of an inflorescence. —D. Dorsal sepal. —E. Petals. —F. Synsepal formed by the lateral sepals. —G. Lip. —H. Anther. —I. Flower, oblique view. —J. Column. Drawing from living material.

broadly obovate to subspherical, slightly asymmetric, erect to patent, greenish yellow to brownish yellow, 0.5–0.7 × 0.4–0.7 mm, margin entire, apex obtuse to rounded; lip glabrous at the abaxial face, papillose at the adaxial face, fleshy, concave, ovate, erect to patent, 0.6–0.9 × 0.5–0.7 mm, yellow, greenish yellow, or brownish yellow, margin papillose, apex acute to obtuse, column glabrous, erect to patent,

curved at the dorsal region, straight at the ventral region, apical portion larger than the basal portion, yellow to yellowish green, sometimes with some vinaceous spots, 0.4–0.6 × 0.3–0.5 mm, apex obtuse, column foot 0.1–0.2 mm; anther slightly papillose, white to cream colored, ca. 0.2 × 0.3 mm; pollinia 2, subspherical to obovoid, hard, yellow, 0.1–0.15 × 0.05–0.08 mm; rostellum oblong to triangular, apex rounded, stigmatic cavity flat. Fruit spherical to widely ellipsoid, ribbed, 1.9–2.1 × 1.5–1.7 mm.

Distribution and habitat. *Lepanthopsis vellozicola* is currently known to occur only in the Serra do Caraça, state of Minas Gerais, Brazil. The species grows exclusively as an epiphyte on *Vellozia compacta* Martius in rocky fields between 1750 and 1900 m (pers. obs.). It is a very rare species and only a few populations have been encountered so far. Individuals of this species form tufts of varied sizes that are usually isolated from one another, but many individuals can often be found on a single host plant.

IUCN Red List category. According to the current knowledge of the species and using IUCN Red List categories and criteria (IUCN, 2001), *Lepanthopsis vellozicola* can be classified as Critically Endangered (CR B2ab[iii]). The only known population grows along the trail leading to Pico do Sol, a popular spot for hikers and climbers in the Serra do Caraça.

Phenology. *Lepanthopsis vellozicola* was observed in flower from February to May.

Etymology. The specific epithet refers to the observation that the species is epiphytic on *Vellozia* Vandelli.

Diagnostic features. The new species is unique in the genus by the smooth margins of the two leaf sheaths of its secondary stem, the presence of only two evident internodes on each secondary stem, the lateral sepals that are fused to the apex, and by appearing as an epiphyte exclusively on *Vellozia*. Its vegetative habit somewhat resembles that of *Lepanthopsis microlepanthes* (Grisebach) Ames, since both are minute plants. Both possess the smallest leaves and secondary stems within the genus and both have leaves longer than or equaling the respective secondary stem. In all other characteristics, however, the two species are distinct and belong to different subgenera, with *L. microlepanthes* belonging to subgenus *Microlepanthes* Luer. *Lepanthopsis vellozicola* belongs to section *Lepanthopsis*, which is characterized by the strict, dense, and simultaneously many-flowered racemes with flowers in two opposing ranks (Luer, 1991). The only other species in the genus occurring in Brazil, *L. densiflora* and *L. floripecten*, also belong to section *Lepanthopsis* and share the characteristic raceme pattern. *Lepanthopsis vellozicola* also shares this general raceme pattern with the other species of section *Lepanthopsis*, but differs otherwise.

The secondary stem of *Lepanthopsis vellozicola* shows only two evident internodes, subtended by two leaf sheaths. The basal internodes are reduced and covered with imbricate prophylls. These prophylls are smaller and morphologically distinct from the leaf sheaths. The first leaf sheath is distal, larger, and covers almost all the secondary stem, from near its base to the leaf base, while the second one is imbricate and arises from the basal portion of the secondary stem to reach approximately the midpoint of the first sheath. In the new species, inflorescences can arise successively from the apex of the same secondary stem for several years, but only one inflorescence is produced each year.

The species of *Lepanthopsis* known to occur in Brazil can be recognized by the following key.

KEY TO THE SPECIES OF *LEPANTHOPSIS* IN BRAZIL

1a. Plant epiphytic exclusively on *Vellozia*; margins of leaf sheaths of the secondary stem smooth; secondary stem to 4 mm long, with only two internodes evident; lateral sepals completely connate . . . . . *L. vellozicola*

1b. Plant epiphytic but not observed on *Vellozia*; margins of leaf sheaths of the secondary stem scabrous or ciliate; secondary stem 4 mm long or longer, with at least three internodes evident; lateral sepals connate to near the apex.

  2a. Sheath margins of the secondary stem scabrous; leaves narrowly elliptic; lateral sepals to 1.5 mm long, ovate, connate to the midpoint or nearly so; apex of the lateral sepals acute; corolla lip ovate. . . . . *L. densiflora*

  2b. Sheath margins of the secondary stem ciliate; leaves oblong to elliptic; lateral sepals at least 3.5 mm long, oblong, connate nearly to the apex; apex of the lateral sepals obtuse; corolla lip suborbicular . . . . . *L. floripecten*

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